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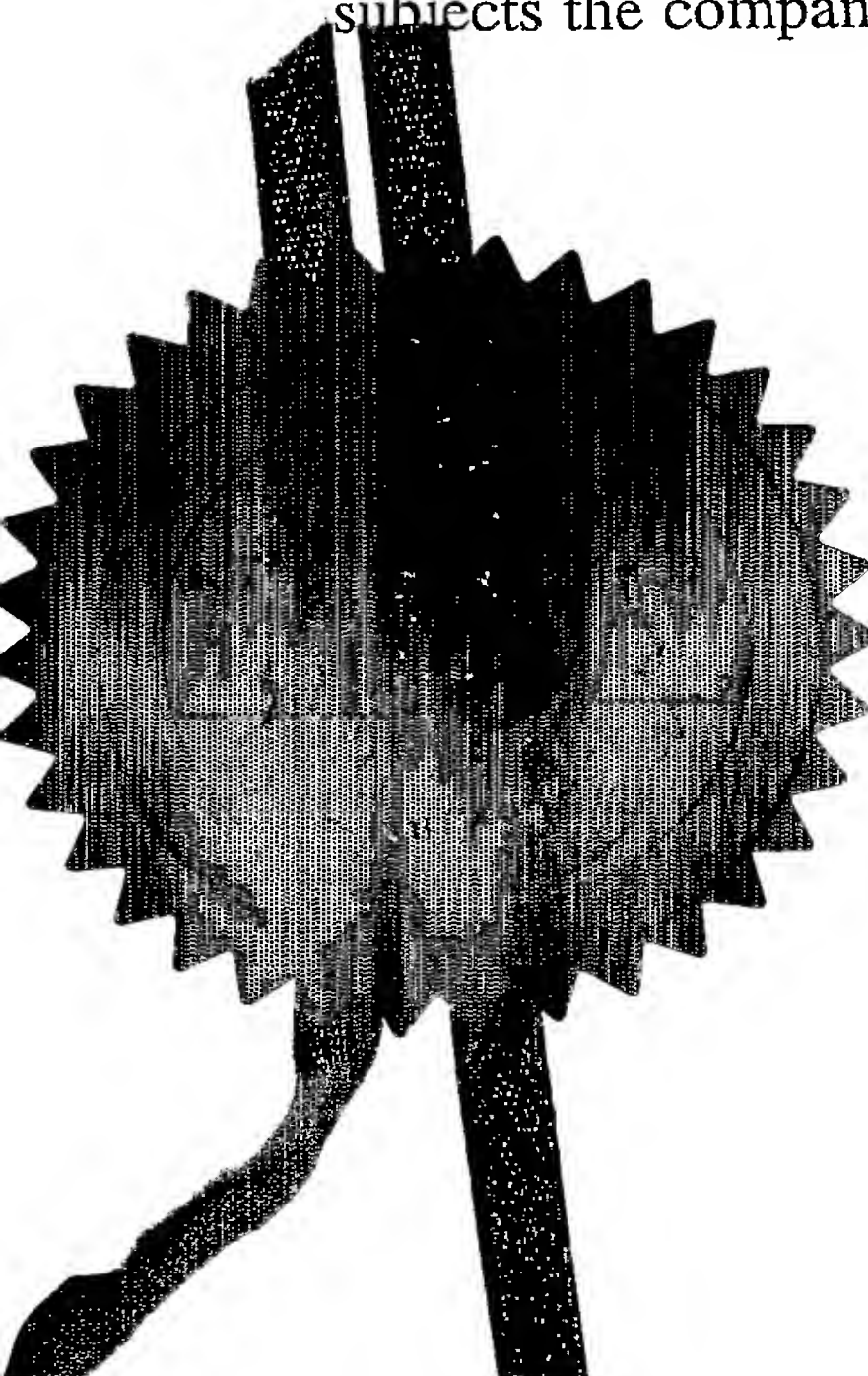
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Air venting system

Field of the invention

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The invention relates to an air venting system for absorbing odors emanating from a waste treatment plant, installation, system, or from a conduit used for conveying waste materials

10 The prior art

The use of a filtering system associated with an air inlet or air outlet has already been proposed.

15 For example, DE 196 23 053 discloses a filtration system of the gases emitted by a waste disposal unit. The filtration system has a filter unit for the prevention of odor nuisance from the waste disposal unit. The filter unit comprises a loose or packed ballast, such as activated charcoal, said loose or packed ballast being placed in a tube with outer wall presenting apertures and with a bottom plate forming a rest
20 for the ballast. The air flow in this system is only upwards.

In the United States and Canada, a product known as « Odorhog »TM is marketed as septic vent pipe filter for preventing problems due to odors from septic tanks. The filtering system comprises a tube in which the charcoal filter is placed. The
25 air flow in the OdorHog device is only upwards.

The major problems of all the filtering system of the prior art are efficiency, clogging and airflow restriction. In the filtering system of the prior art, it is necessary to use charcoal filter with a quite high length, whereby causing an
30 important venting restriction and whereby many gases will be kept in the waste

water drainage system. This could then cause odors to escape via any other venting systems, leaks in the plumbing system, and even possibly when using the toilets.

The present invention has for aim a compact filtering system which is efficient
5 while having a reduced air flow restriction. These results have been achieved by using a system whereby the gas to be filtered flows according to a path comprising an upwards flow portion and a downwards flow portion.

Brief description of the invention

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The invention relates to an air venting system for a gas exhaust conduit of waste treatment system or waste conveying system, said system comprising :

- a body defining an inner chamber; said body having at least one inlet opening intended for receiving gases from the gas exhaust conduit and at least one outlet
15 opening intended for releasing gases out of the body, and
 - at least one odor absorbing means placed in the inner chamber,
- whereby the system is adapted for defining a gas flowing path between the inlet opening and the outlet opening, said flowing path having at least a first flow path portion with a first flow direction defined by at least one vector and a second flow
20 path portion with a second flow direction defined by at least one vector, whereby at least one vector of the second flow direction is opposite to a vector of the first flow direction.

Preferably, the system is adapted for defining a gas flowing path between the inlet opening and the outlet opening, said flowing path comprising at least an upwards
25 flow path portion and a downwards flow path portion.

Advantageously, the odor absorbing means is placed in the inner chamber so as to define a volume free of odor absorbing means, whereby gas flowing from the inlet opening towards the outlet opening flows at least partly from the inlet opening
30 through a portion of the odor absorbing means towards the volume free of odor absorbing means, and from the volume free of the odor absorbing means towards

the outlet opening. Such a free volume is able to form a buffer volume, suitable for having a better distribution of the gas to be treated after an upwards flow, for its downwards flow.

- 5 Preferably, the odor absorbing means is placed in the inner chamber so as to define a volume free of odor absorbing means, whereby gas flowing from the inlet opening towards the outlet opening flows at least partly according to an upwards flow path from the inlet opening through a portion of the odor absorbing means towards the volume free of odor absorbing means, and at least partly according to a
10 downwards path from the volume free of the odor absorbing means towards the outlet opening.

- Most preferably, the odor absorbing means is a charcoal containing absorbing means. The odor absorbing means can comprise further agent(s) and/or additive(s),
15 such as biocides, bactericides, virucides, fungicides, etc., and mixtures thereof.

- According to an embodiment, the odor absorbing means has an inlet surface and an exhaust surface, whereby gas flowing from the inlet opening towards the outlet opening flows in the odor absorbing means through the inlet surface and outlet the
20 odor absorbing means through the exhaust surface, whereby the exhaust surface is at least greater than the inlet surface, preferably greater than 1.5 times the inlet surface, most preferably comprised between 1.5 and 5 times the inlet surface.

- According to a preferred embodiment, the air venting system comprises a tubular
25 body defined by a cylindrical wall and extending between a bottom end up to a top end, a cover cooperating with the top end of the tubular body to form a chamber extending above the top end of the tubular body and associated with a peripheral channel extending outlet the cylindrical wall of the tubular body, whereby the bottom end of the tubular body defines the inlet opening, while the peripheral
30 channel is provided with at least one outlet opening, and whereby the odor absorbing means is located at least partly in the chamber.

According to a detail of said embodiment,

- the odor absorbing means is located at least partly in the chamber, as well as partly in the peripheral channel or
- the odor absorbing means is located at least partly in the chamber, as well as partly in the tubular body or
- the odor absorbing means is located at least partly in the chamber, as well as partly in the tubular body and at least partly in the peripheral channel.

According to a specific embodiment, the odor absorbing means has the form of a body, said body having a circular groove in which the top end of the tubular body is introduced. Such a body can have the form of a cassette, which can be easily replaced when required

The invention relates also to a process in which the odor emanating from a venting conduit is connected to a waste treatment station, plant such as septic tank, etc., or a conduit for conveying waste materials, such as drain, sewer, main sewer, etc.

Details and characteristics of preferred embodiments will appear from the following description in which reference is made to the attached drawings.

Brief description of the drawings

Figure 1 is a cross section view of a first embodiment.

Figure 2 is an exploded view of the various parts of the first embodiment of figure 1.

Figure 3 is a cross section view of a second embodiment.

Figure 4 is a schematic exploded view of a third embodiment.

Figures 5 and 6 are cross sections views of the third embodiments along the lines V-V and VI-VI.

Description of preferred embodiments

Figures 1 and 2 are views of a first embodiment of an air venting system of the invention.

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The air venting system 1 comprises :

- a tubular body 2 defined by a cylindrical wall 3 and extending between a bottom end 4 up to a top end 5,
- a cover 6 cooperating with the top end 5 of the tubular body 2 to form a chamber 7 extending above the top end 5 of the tubular body 2 and associated with a peripheral channel 8 extending outside a portion of the cylindrical wall 3 of the tubular body 2 .

10

The bottom end 4 of the tubular body 2 defines the inlet opening 9, while the peripheral channel 8 is provided with at least one outlet opening 10.

15

The odor absorbing means 11 is located at least partly in the chamber 7, partly in the peripheral channel 8 and partly in the tubular body 2. The odor absorbing means has the form of a body 11, said body 11 having a circular groove 12 in which the top end 5 of the tubular body 2 is introduced.

20

The tubular body 2 is provided with a flange 13 showing openings 10, possibly provided with screen, such as metallic screen 14. The flange 13 is provided at its end with a ring 15 provided with means for cooperating with a portion of the cover 6, so as to enable its fixation.

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The odor absorbing means 11 has an upper face 16 which is spaced from the top inner face of the cover 6, whereby defining a volume 17 in the chamber 7 which is free of odor absorbing means, i.e. a buffer volume. The odor absorbing means 11 has an inlet surface 11A and an exhaust surface 11B, whereby the exhaust surface 11B is greater than the inlet surface. The exhaust surface 11B is distant from the

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flange 13 and the screen 14. In this example the exhaust surface is from about 3 to 10 times greater than the inlet surface.

The cover can be provided with a means for pushing the odor absorbing means
5 towards the cylindrical body 2, such a means 20 being for example a button placed at the center of the inner top face of the cover.

The working of the air venting system of figure 1 is as follows :

The odor emanating from a sewer or waste water containing system are moving
10 upwards in the circular body 2, said odor entering into the odor absorbing means 11 through the inlet surface 11A. In said odor absorbing means 11, the odor flows first upwardly in the portion of the absorbing body 11 within the circular body 2. After said absorbing portion, the odor flows partly upwardly towards the volume 17 free of odor absorbing means before flowing back in the portion of the odor
15 absorbing means adjacent to the exhaust surface 11B, and partly transversally into the portion of the odor absorbing means adjacent to the exhaust surface 11B. The air or gas escaping the odor absorbing means are exhausted via the screen 14. The top portion of the cylindrical body 2 forms thus a partition wall in the odor absorbing means.

20

Air can also enter in the circular body 2 from the exterior.

The portion of the odor absorbing body 11 within the circular body 2 is in close contact with the inner wall of the body 2 so as to avoid leaks between the odor
25 absorbing body 11 and the inner wall of the circular body 2.

The odor absorbing body 11 can have the form of a cassette which can be replaced when required. The outer edge of the cassette are for example made of a porous skin or layer, such as a flexible skin made of woven material. The body is then for
30 example containing fibers mixed with the active charcoal. The outer skin or layer

of the body 11 is advantageously treated or provided with a water repelling agent, such as a fluorosilane.

5 The thickness E of the body is advantageously at least 10cm, while the height H of the portion of the body 11 in the circular body 2 is at least 50% of the thickness of the body 11.

10 The volume of the odor absorbing body 11 is divided in two portions, namely a central portion defined by the portion defined by the groove 12 and its upwardly extension, and a peripheral portion located outside of the central portion, said peripheral portion having advantageously a volume at least equal, preferably greater than the volume of the central portion.

15 The volume free of odor absorbing means 17 can be used as means for ensuring preferably an upwards movement of the gas to be exhausted in the central portion of the odor absorbing means 11, and a good distribution of the flow of gas from the free volume 17 into the peripheral portion of the odor absorbing means 11.

20 Possibly the odor absorbing means can be formed by two or more independent parts, which are placed the one near the other in the chamber 7.

25 The embodiment of figure 3 is similar to the embodiment of figure 1, except that the odor absorbing means has a reduced thickness, so that substantially no portion of the odor absorbing means extends in the cylindrical body 2. The odor absorbing body 11 is provided with an inner cylindrical wall 11W, so as to define in said odor absorbing means a central portion and a peripheral portion. The inner wall 11W is adapted for resting on the top edge of the cylindrical body 2. The inner wall is advantageously provided with a sealing means 11S so as to make a correct sealing between the bottom edge of the inner wall 11W and the top edge of the cylindrical
30 body 2. The inner edge extends for example substantially in all the thickness of the odor absorbing means, so that the gas emanating from a sewer or waste water

drainage system flows substantially only from the body 2 into the free volume 17 of the chamber 7 through the central portion of the odor absorbing body, and then from said free volume 17 of the chamber towards the exhaust opening 10 through the peripheral portion of the odor absorbing body 11.

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The embodiment of figure 4 is similar to the embodiment of figure 1, except that the chamber 7 intended to contain the odor absorbing means 11 has a specific shape. The chamber 7 is defined between the cover 6 and an extension 2A of the circular body 2. The filtering body 11 comprises four different portions

10 110,111,112,113 intended to be located each in a specific portion of the chamber 7.

The filtering body 11 comprises:

- a substantially cylindrical top element 110, said top element bearing on its bottom face the three elements 111,112 and 113,
- the element 111 having a substantially 8-shape with a thickness varying
15 between a minimum at its central portion and a maximum at its end adjacent to the exhaust opening 10,
- the elements 112 and 113 being located each in the gap of the 8-shaped element 111, said elements 112,113 being separated from the element 111 by a groove 118 intended to receive a separating wall 120 extending between the inlet
20 opening 125 of the extension 2A and the exhaust opening 10.

Above the filter 11, a closed volume 17 free of odor absorbing means 11 is defined.

The inlet openings 125 are provided with a screen 126 acting as supporting means
25 for the bottom faces of the elements 112 and 113, while the exhaust openings 10 are provided with a screen 14 acting more as protection means.

The working of the air venting device of figure 4 is as follows :

30 The odor emanating from a sewer or waste water drainage system flows in the pipe 2. When the odor arrives in the extension 2A, the odor flow is split in two

distinct flows, namely a first flow flowing in the filtering element 112 and a second flow flowing in the filtering element 113. In said filtering elements 112,113, the gas containing odor flows upwardly towards the upper filtering portion 110 and the free volume 17 of the chamber 7. The gas containing possibly some odor after its upwardly flows in the filtering elements 112,113, is split, namely a first portion of gas flowing in the left portion of the filtering element 111 before being exhausted via the exhaust opening 10A, and a second portion of gas flowing in the right portion of the filtering element 111 before being exhausted via the exhaust opening 10B. In the filtering element 111, the gas flows downwardly and transversally towards the exhaust faces 111A,111B, before being exhausted via the exhaust openings 10A,10B.

In this embodiment, the inlet faces 112A,113A of the filtering elements 112,113 have a total inlet surface corresponding substantially to the sum of the surfaces of the two exhaust faces 111A,111B of the filtering element 111.

Advantageously the element 111 has two protrusions 111C,111D, the top of which being adjacent to the exhaust openings. A bottom face of each protrusion rests on a closed inclined face of the extension 2A. The height H1 and the length L1 of a protrusion is higher than the thickness E1 of the substantially cylindrical top portion 110 of the filtering element, so that the gas flows preferably upwardly towards the top free volume 17, before being redistributed and flowing downwardly into the filtering portion 111, more specifically in the protruding portions 111C,111D.

According to possible embodiment, the filtering body 11 is not provided with the portion 111 or with the portions 112,113.

What I claim is :

1. An air venting system for a gas exhaust conduit of waste treatment system or
5 waste conveying system, said system comprising :
 - a body defining an inner chamber; said body having at least one inlet opening intended for receiving gases from the gas exhaust conduit and at least one outlet opening intended for releasing gases out of the body, and
 - at least one odor absorbing means placed in the inner chamber,
10 whereby the system is adapted for defining a gas flowing path between the inlet opening and the outlet opening, said flowing path having at least a first flow path portion with a first flow direction defined by at least one vector and a second flow path portion with a second flow direction defined by at least one vector, whereby at least one vector of the second flow direction is opposite to a vector of the first flow
15 direction.
2. The air venting system of claim 1, in which the system is adapted for defining a gas flowing path between the inlet opening and the outlet opening, said flowing path defining at least an upwards flow path portion and a downwards flow path
20 portion.
3. The air venting system of claim 1, in which the odor absorbing means is placed in the inner chamber so as to define a volume free of odor absorbing means, whereby gas flowing from the inlet opening towards the outlet opening flows at
25 least partly from the inlet opening through a portion of the odor absorbing means towards the volume free of odor absorbing means, and from the volume free of the odor absorbing means towards the outlet opening.
4. The air venting system of claim 1, in which the odor absorbing means is placed
30 in the inner chamber so as to define a volume free of odor absorbing means, whereby gas flowing from the inlet opening towards the outlet opening flows at

least partly according to an upwards flow path from the inlet opening through a portion of the odor absorbing means towards the volume free of odor absorbing means, and at least partly according to a downwards path from the volume free of the odor absorbing means towards the outlet opening.

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5. The air venting system of claim 1, in which the odor absorbing means is a charcoal containing absorbing means.

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6. The air venting system of claim 1, in which the odor absorbing means has an inlet surface and an exhaust surface, whereby gas flowing from the inlet opening towards the outlet opening flows in the odor absorbing means through the inlet surface and outlet the odor absorbing means through the exhaust surface, whereby the exhaust surface is at least greater than the inlet surface.

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7. The air venting system of claim 1, in which the odor absorbing means has an inlet surface and an exhaust surface, whereby gas flowing from the inlet opening towards the outlet opening flows in the odor absorbing means through the inlet surface and outlet the odor absorbing means through the exhaust surface, whereby the exhaust surface is greater than 1.5 times the inlet surface.

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8. The air venting system of claim 1, in which the odor absorbing means has an inlet surface and an exhaust surface, whereby gas flowing from the inlet opening towards the outlet opening flows in the odor absorbing means through the inlet surface and outlet the odor absorbing means through the exhaust surface, whereby the exhaust surface is comprised between 1.5 and 5 times the inlet surface.

25

9. The air venting system of claim 1, said system comprising a tubular body defined by a cylindrical wall and extending between a bottom end up to a top end, a cover cooperating with the top end of the tubular body to form a chamber extending above the top end of the tubular body and associated with a peripheral channel extending outlet the cylindrical wall of the tubular body, whereby the

30

bottom end of the tubular body defines the inlet opening, while the peripheral channel is provided with at least one outlet opening, and whereby the odor absorbing means is located at least partly in the chamber.

- 5 10. The air venting system of claim 1, said system comprising a tubular body defined by a cylindrical wall and extending between a bottom end up to a top end, a cover cooperating with the top end of the tubular body to form a chamber extending above the top end of the tubular body and associated with a peripheral channel extending outlet the cylindrical wall of the tubular body, whereby the
- 10 bottom end of the tubular body defines the inlet opening, while the peripheral channel is provided with at least one outlet opening, and whereby the odor absorbing means is located at least partly in the chamber, as well as partly in the peripheral channel.
- 15 11. The air venting system of claim 1, said system comprising a tubular body defined by a cylindrical wall and extending between a bottom end up to a top end, a cover cooperating with the top end of the tubular body to form a chamber extending above the top end of the tubular body and associated with a peripheral channel extending outlet the cylindrical wall of the tubular body, whereby the
- 20 bottom end of the tubular body defines the inlet opening, while the peripheral channel is provided with at least one outlet opening, and whereby the odor absorbing means is located at least partly in the chamber, as well as partly in the tubular body.
- 25 12. The air venting system of claim 1, said system comprising a tubular body defined by a cylindrical wall and extending between a bottom end up to a top end, a cover cooperating with the top end of the tubular body to form a chamber extending above the top end of the tubular body and associated with a peripheral channel extending outlet the cylindrical wall of the tubular body, whereby the
- 30 bottom end of the tubular body defines the inlet opening, while the peripheral channel is provided with at least one outlet opening, and whereby the odor

absorbing means is located at least partly in the chamber, as well as partly in the tubular body and at least partly in the peripheral channel.

13. The air venting system of claim 12, in which the odor absorbing means has the form of a body, said body having a circular groove in which the top end of the tubular body is introduced.

14. A process for absorbing odor exhausted through an outlet of a gas exhaust conduit of waste treatment system or waste conveying system, in which the outlet of said gas exhaust conduit is provided with a system comprising :

- a body defining an inner chamber; said body having at least one inlet opening intended for receiving gases from the gas exhaust conduit and at least one outlet opening intended for releasing gases out of the body, and
- at least one odor absorbing means placed in the inner chamber,

whereby the system is adapted for defining a gas flowing path between the inlet opening and the outlet opening, said flowing path having at least a first flow path portion with a first flow direction defined by at least one vector and a second flow path portion with a second flow direction defined by at least one vector, whereby at least one vector of the second flow direction is opposite to a vector of the first flow direction.

15. The process of claim 14, in which the system is adapted for defining a gas flowing path between the inlet opening and the outlet opening, said flowing path defining at least an upwards flow path portion and a downwards flow path portion.

16. The process of claim 14, in which the odor absorbing means is placed in the inner chamber so as to define a volume free of odor absorbing means, whereby gas flowing from the inlet opening towards the outlet opening flows at least partly from the inlet opening through a portion of the odor absorbing means towards the volume free of odor absorbing means, and from the volume free of the odor absorbing means towards the outlet opening.

17. The process of claim 14, in which the odor absorbing means is placed in the inner chamber so as to define a volume free of odor absorbing means, whereby gas flowing from the inlet opening towards the outlet opening flows at least partly according to an upwards flow path from the inlet opening through a portion of the odor absorbing means towards the volume free of odor absorbing means, and at least partly according to a downwards path from the volume free of the odor absorbing means towards the outlet opening.
18. The process of claim 14, in which the odor absorbing means is a charcoal containing absorbing means.
19. The process of claim 14, in which the odor absorbing means has an inlet surface and an exhaust surface, whereby gas flowing from the inlet opening towards the outlet opening flows in the odor absorbing means through the inlet surface and outlet the odor absorbing means through the exhaust surface, whereby the exhaust surface is at least greater than the inlet surface.
20. The process of claim 14, in which the odor absorbing means has an inlet surface and an exhaust surface, whereby gas flowing from the inlet opening towards the outlet opening flows in the odor absorbing means through the inlet surface and outlet the odor absorbing means through the exhaust surface, whereby the exhaust surface is greater than 1.5 times the inlet surface.
21. The process of claim 14, in which the odor absorbing means has an inlet surface and an exhaust surface, whereby gas flowing from the inlet opening towards the outlet opening flows in the odor absorbing means through the inlet surface and outlet the odor absorbing means through the exhaust surface, whereby the exhaust surface is comprised between 1.5 and 5 times the inlet surface.

22. The process of claim 14, in which the system comprises a tubular body defined by a cylindrical wall and extending between a bottom end up to a top end, a cover cooperating with the top end of the tubular body to form a chamber extending above the top end of the tubular body and associated with a peripheral channel extending outlet the cylindrical wall of the tubular body , whereby the bottom end of the tubular body defines the inlet opening, while the peripheral channel is provided with at least one outlet opening, and whereby the odor absorbing means is located at least partly in the chamber.

23. The process of claim 14, in which the system comprises a tubular body defined by a cylindrical wall and extending between a bottom end up to a top end, a cover cooperating with the top end of the tubular body to form a chamber extending above the top end of the tubular body and associated with a peripheral channel extending outlet the cylindrical wall of the tubular body , whereby the bottom end of the tubular body defines the inlet opening, while the peripheral channel is provided with at least one outlet opening, and whereby the odor absorbing means is located at least partly in the chamber, as well as partly in the peripheral channel.

24. The process of claim 14, in which the system comprises a tubular body defined by a cylindrical wall and extending between a bottom end up to a top end, a cover cooperating with the top end of the tubular body to form a chamber extending above the top end of the tubular body and associated with a peripheral channel extending outlet the cylindrical wall of the tubular body , whereby the bottom end of the tubular body defines the inlet opening, while the peripheral channel is provided with at least one outlet opening, and whereby the odor absorbing means is located at least partly in the chamber, as well as partly in the tubular body.

25. The process of claim 14, in which the system comprises a tubular body defined by a cylindrical wall extending between a bottom end up to a top end, a cover cooperating with the top end of the tubular body to form a chamber extending above the top end of the tubular body and associated with a peripheral

channel extending outlet the cylindrical wall of the tubular body , whereby the bottom end of the tubular body defines the inlet opening, while the peripheral channel is provided with at least one outlet opening, and whereby the odor absorbing means is located at least partly in the chamber, as well as partly in the tubular body and at least partly in the peripheral channel.

26. The process of claim 25, in which the odor absorbing means has the form of a body, said body having a circular groove in which the top end of the tubular body is introduced.

27. An air venting system as described herein and as illustrated by any one or more of the accompanying drawings.



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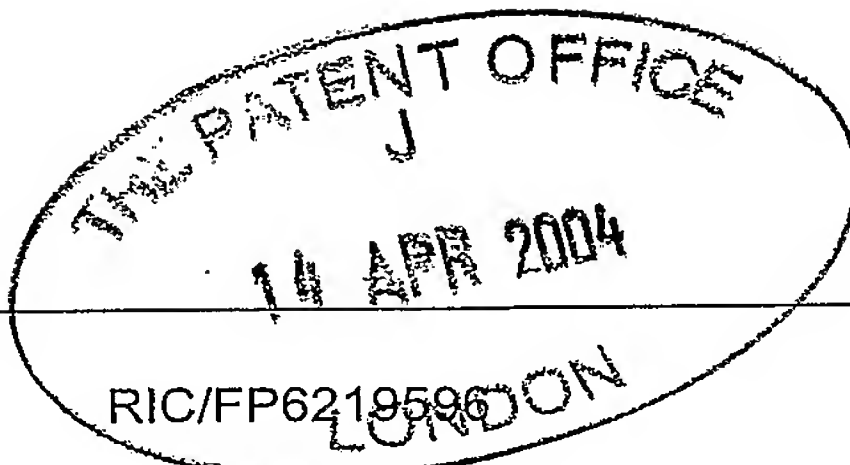
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1. Your reference

2. Patent application number

(The Patent Office will fill this part in)

0408298.8

14 APR 2004

3. Full name, address and postcode of the or of each applicant (*underline all surnames*)

STUDOR S.A.
38 Boulevard Napoléon 1er
L-2210 Luxembourg

Patents ADP number (*if you know it*)

8220675001

If the applicant is a corporate body, give the country/state of its incorporation

Luxembourg

4. Title of the invention

Air Venting System

5. Name of your agent (*if you have one*)

"Address for service" in the United Kingdom to which all correspondence should be sent (*including the postcode*)

MEWBURN ELLIS LLP
York House
23 Kingsway
London WC2B 6HP

Patents ADP number (*if you know it*)

109006 8836884001

6. Priority: Complete this section if you are declaring priority from one or more earlier patent applications, filed in the last 12 months.

Country

Priority application number
(*if you know it*)

Date of filing
(*day / month / year*)

7. Divisionals, etc: Complete this section only if this application is a divisional application or resulted from an entitlement dispute (see note d)

Number of earlier UK application

Date of filing
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8. Is a Patents Form 7/77 (Statement of inventorship and of right to grant of a patent) required in support of this request?

YES

Answer YES if:

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- b) there is an inventor who is not named as an applicant, or
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Patents Form 1/77

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| | |
|----------------------------------|---|
| Continuation sheets of this form | 0 |
| Description | 9 |
| Claim(s) | 7 |
| Abstract | 0 |
| Drawing(s) | 5 |

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Priority documents

| | |
|--|---|
| Translations of priority documents | |
| Statement of inventorship and right to grant of a patent (Patents Form 7/77) | 1 |
| Request for a preliminary examination and search (Patents Form 9/77) | 1 |
| Request for a substantive examination (Patents Form 10/77) | |

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature(s)

Mewburn Ellis LLP

Date 13/04/2004

12. Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom

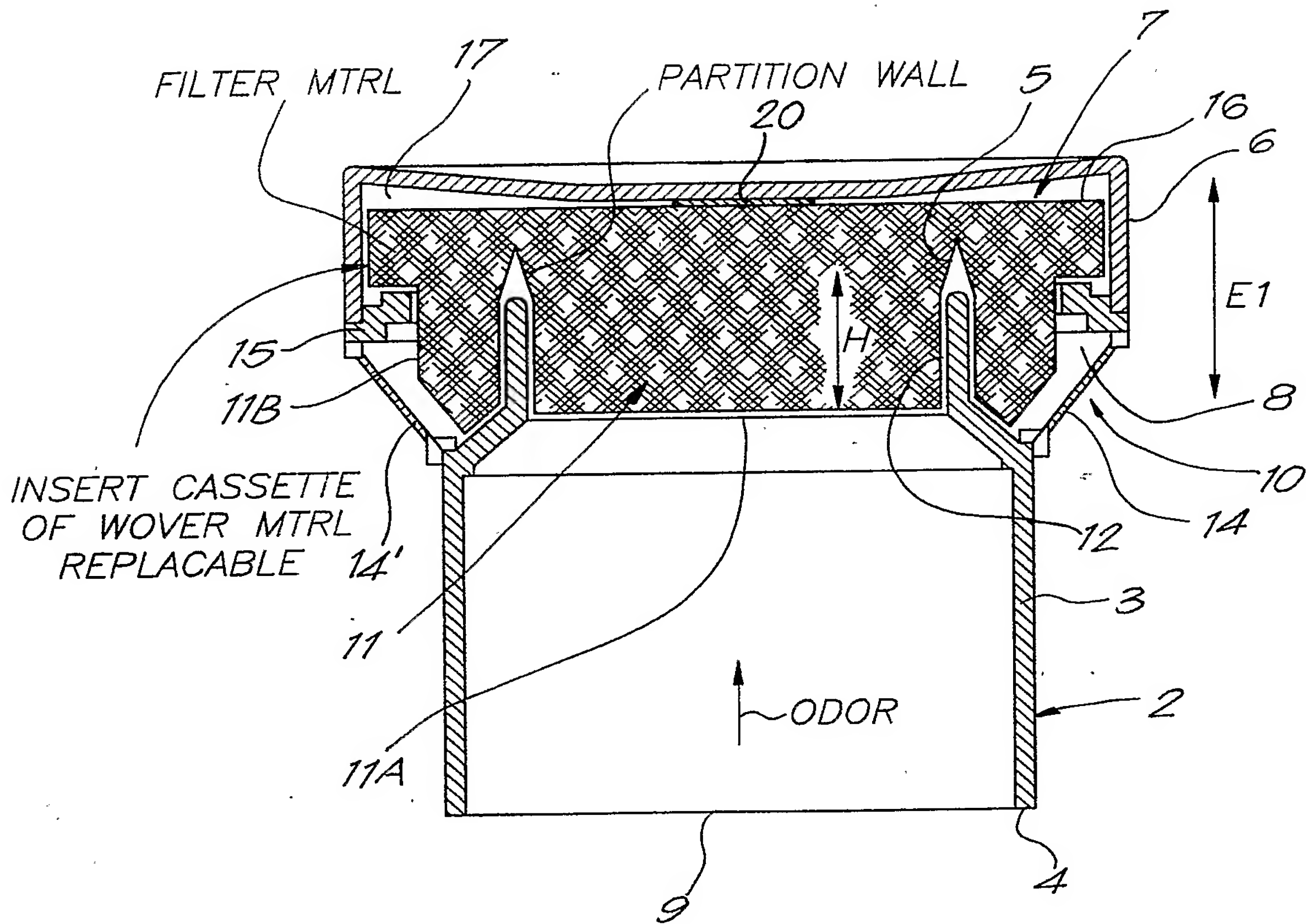
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Notes

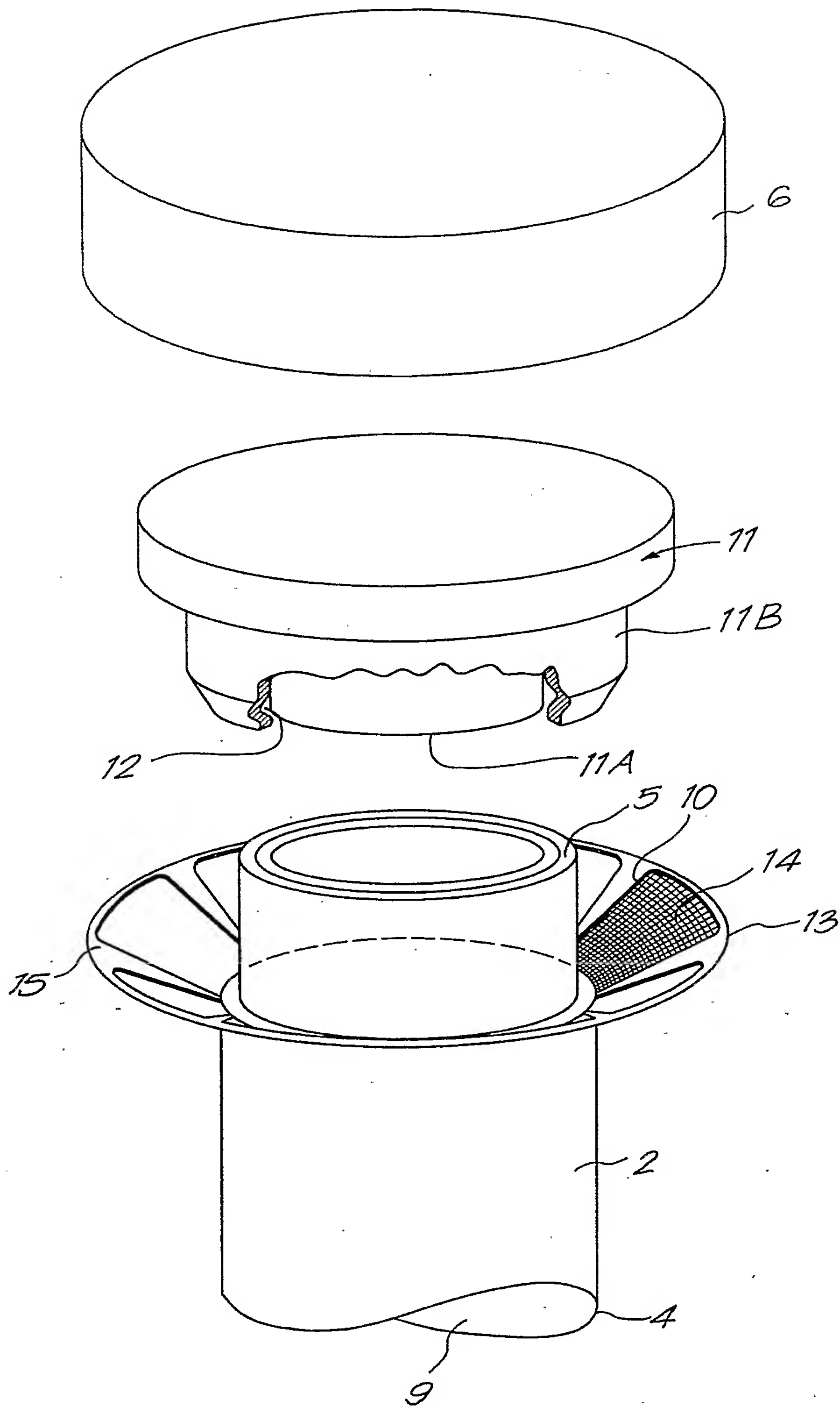
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DUPLICATE NOT TO BE AMENDED

0408298.8



*Fig. 2*

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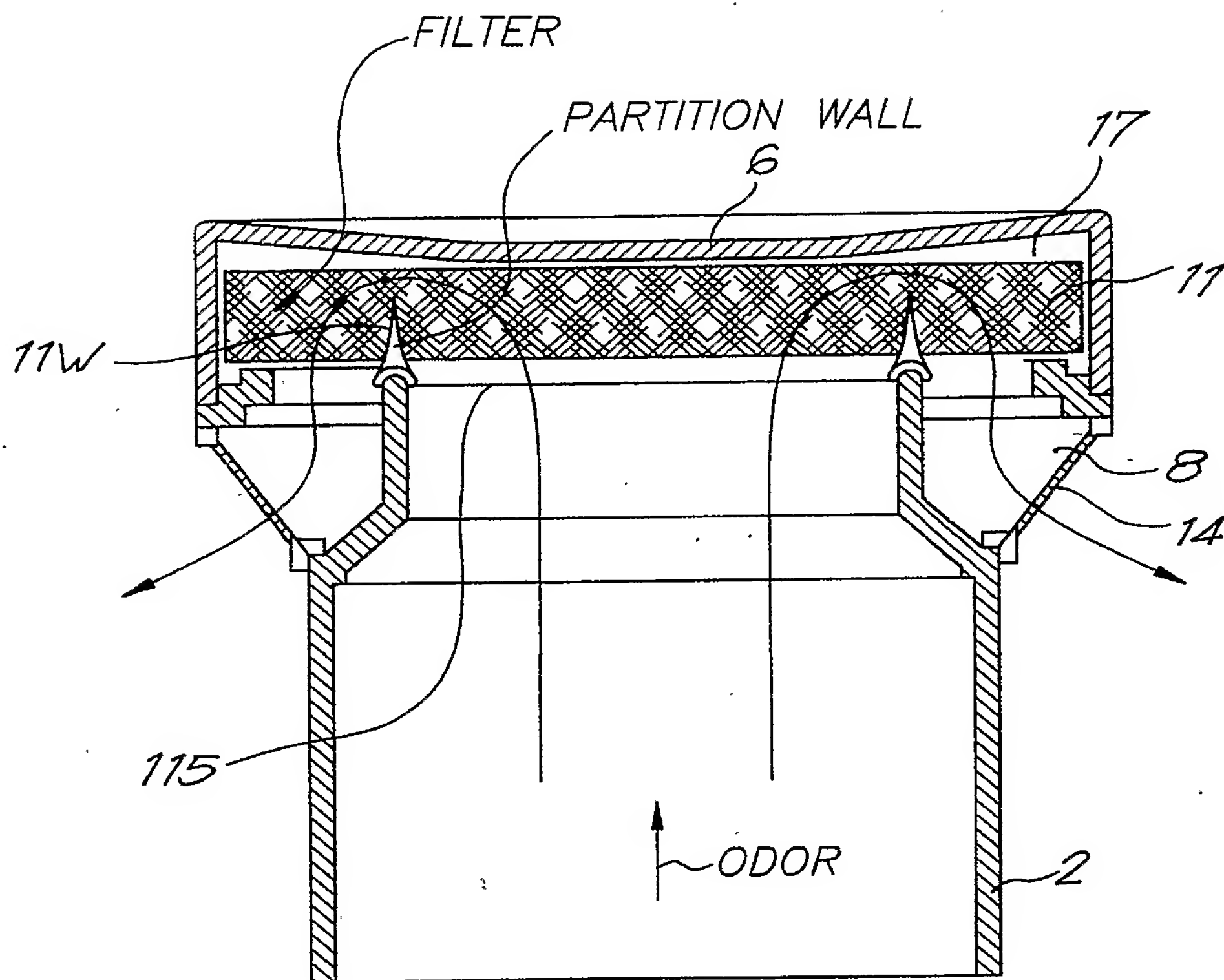
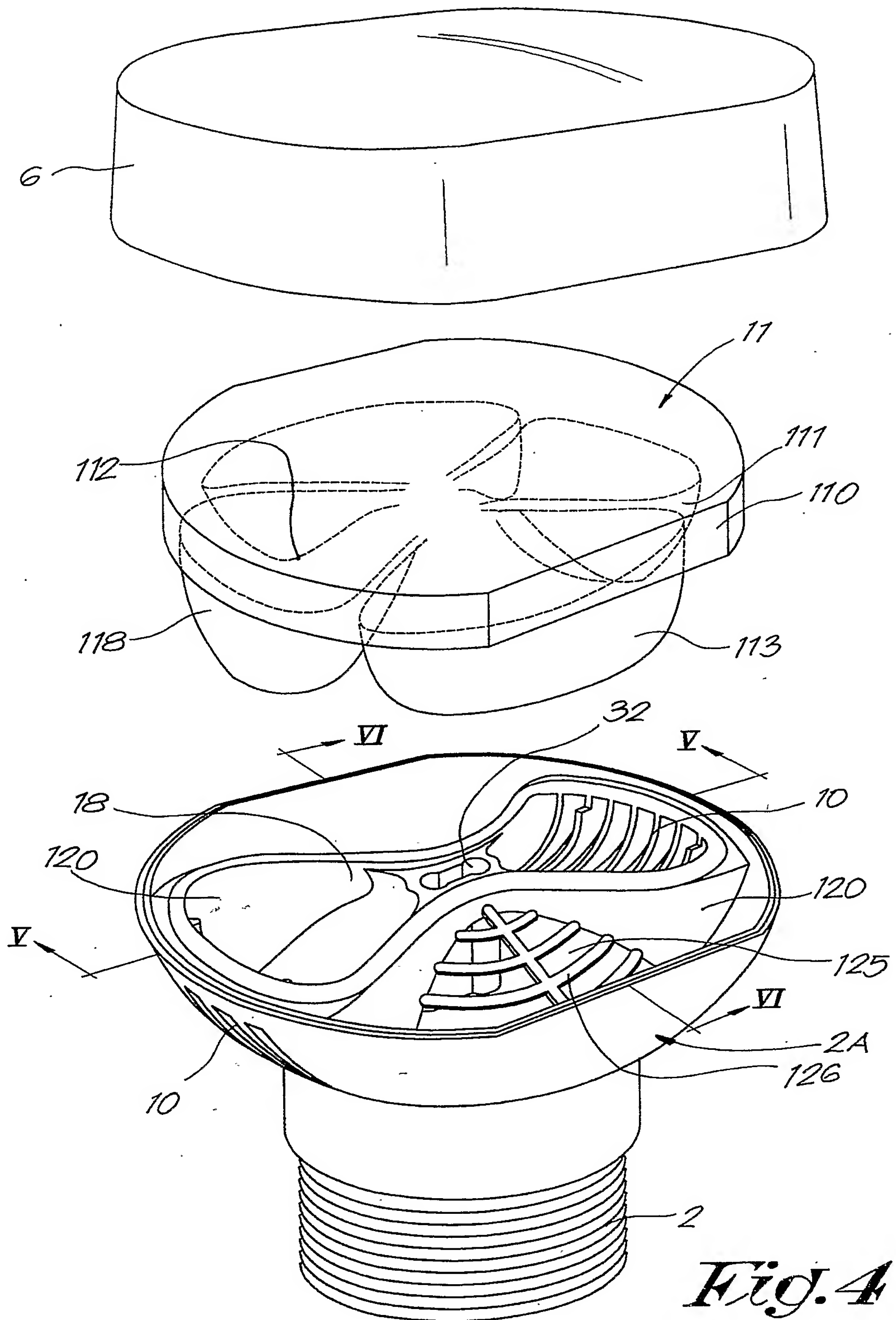


Fig. 3

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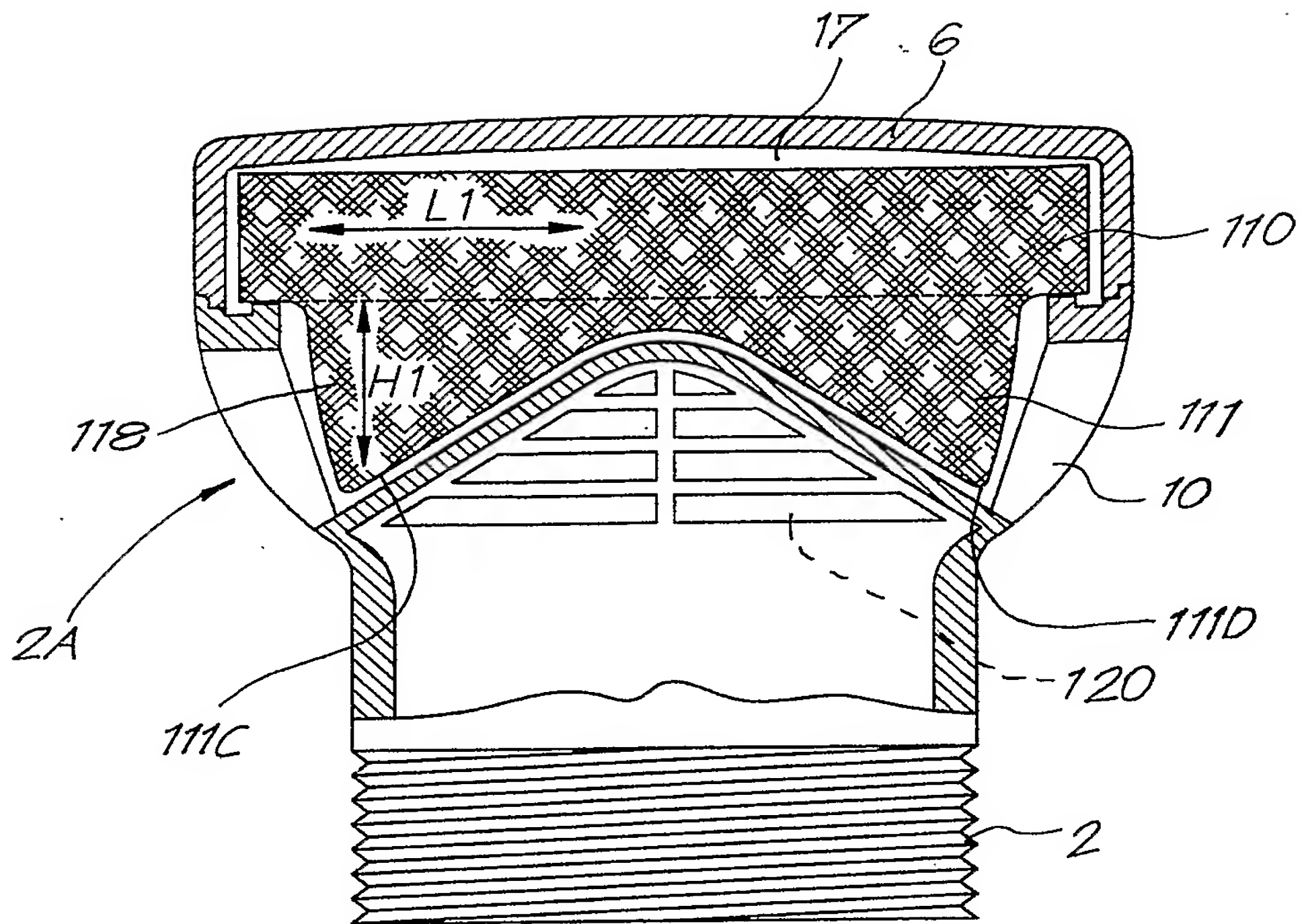


Fig. 5

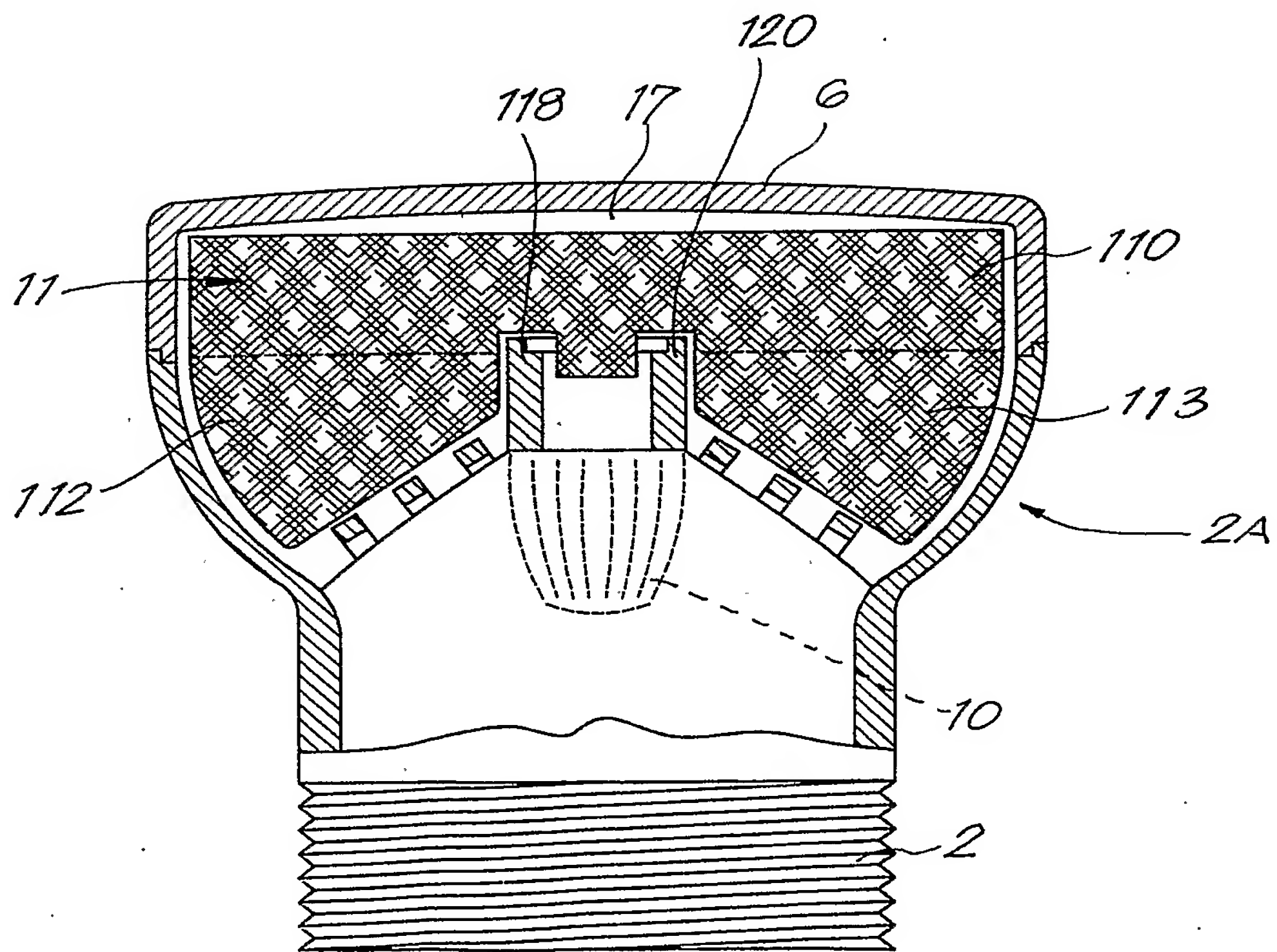


Fig. 6

DUPLICATE NOT TO BE AMENDED

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